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NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON  
NATIONAL DAM SAFETY PROGRAM. SCHILLER POND DAM (NJ00153), DELAW--ETC(U)  
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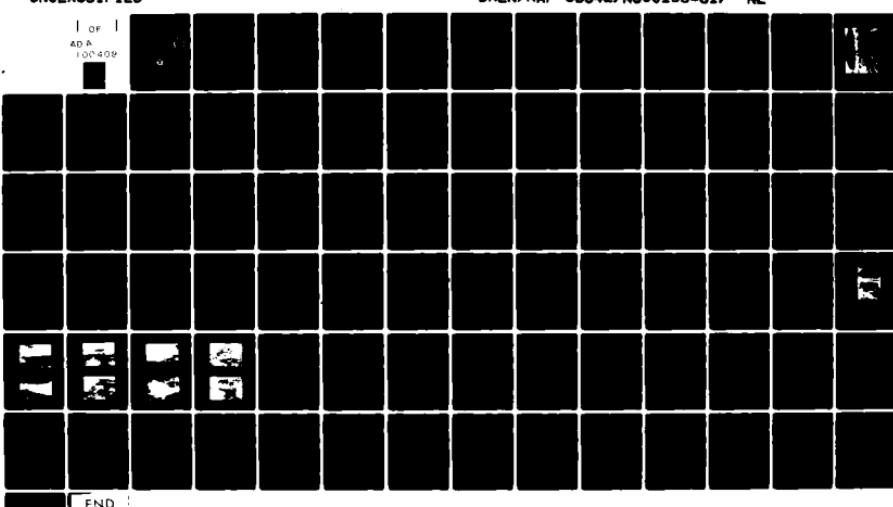
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DELAWARE RIVER BASIN  
TRIBUTARY ALEXAUKEN CREEK,  
HUNTERDON COUNTY  
NEW JERSEY

LEVEL II

# SCHILLER POND DAM

NJ 00153

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## PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



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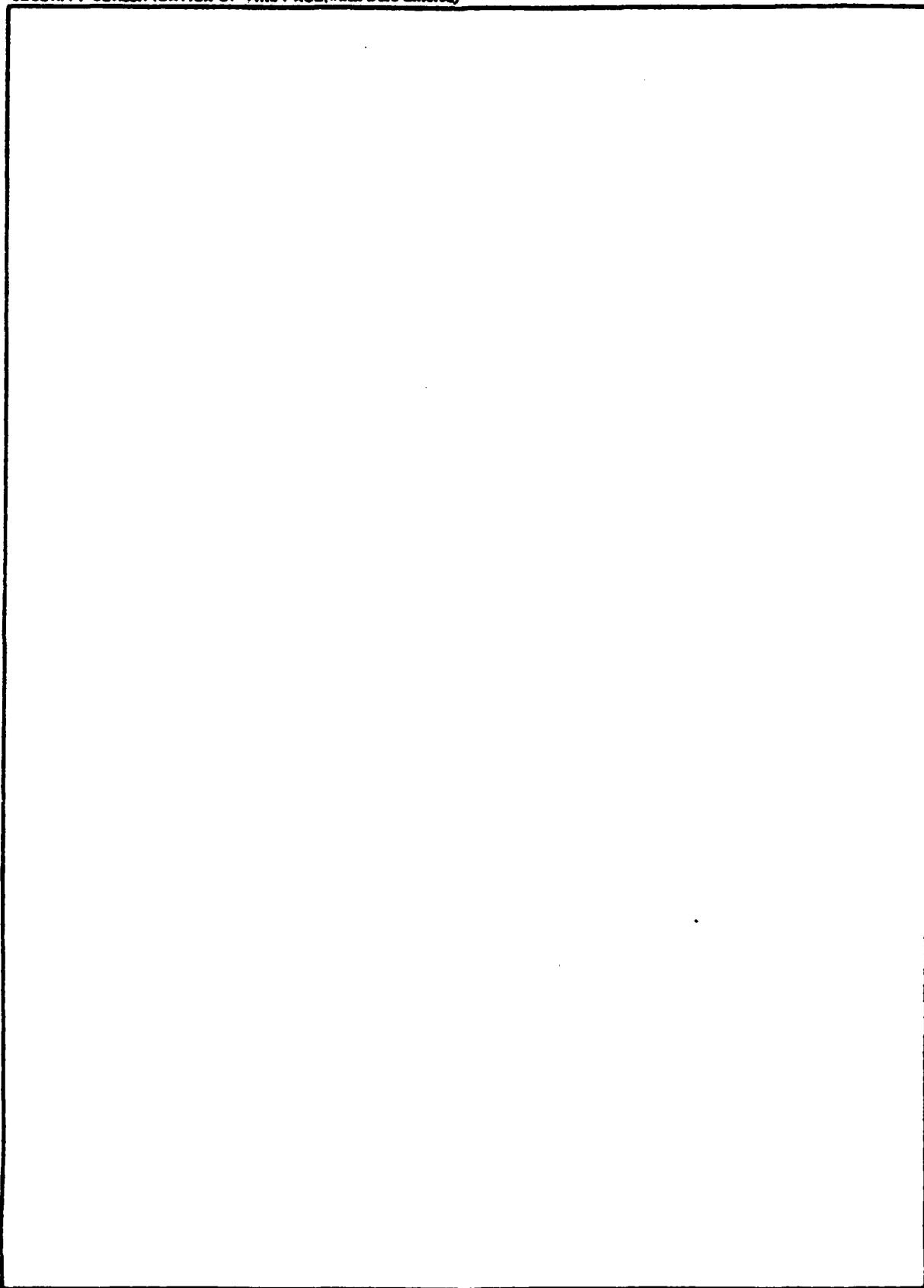
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		

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PHILADELPHIA, PENNSYLVANIA 19106

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Honorable Brendan T. Byrne  
Governor of New Jersey  
Trenton, New Jersey 08621

5 JUN 1981

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Dear Governor Byrne:

Enclosed is the Phase I Inspection Report for Deer Head Lake Dam in Ocean County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. An overall conclusion on the general condition is given in front of the report.

Based on visual inspection, available records, certifications and past operational performance, Deer Head Lake Dam, a high hazard potential structure, is judged to be in good or fair condition. The dam's spillways are considered inadequate because a flow equivalent to eight percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood). The decision to consider the spillways "inadequate" instead of "seriously inadequate" is based on the determination that dam failure resulting from overtopping would not significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillways' adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within twelve months from the date of approval of this report, the following remedial actions should be completed:

(1) Repair the stiltting basin of the left spillway with epoxy cement.

APPENDIX

APPENDIX B - REPORT

1. The following is a copy of the report of the inspection of the New Jersey Department of Environmental Protection, Division of Water Resources, dated January 12, 1978.

2. The inspection was conducted to determine the status of the New Jersey Department of Environmental Protection, Division of Water Resources, in the implementation of the National Pollutant Discharge Elimination System (NPDES) and the New Jersey Water Quality Control Act.

3. The inspection was conducted by the Office of Water Quality Control, Bureau of Water Quality Control, Division of Water Resources.

4. The inspection was conducted by the Office of Water Quality Control, Bureau of Water Resources.

5. The inspection was conducted by the Office of Water Quality Control, Bureau of Water Resources.

6. A copy of the report is being transmitted to Mr. James J. Horan, Director, New Jersey Department of Environmental Protection, the designated state liaison contact for this program. Within five days of the date of this letter, a copy will also be sent to the Office of Water Quality Control, Bureau of Water Resources.

7. Additional copies of this report may be obtained from the National Technical Information Service (NTIS), Springfield, Virginia, paid at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

8. An important aspect of the New Jersey Inspection program will be the implementation of the recommendations made as a result of the inspection. We respectfully request that we be advised of proposed actions taken by the State to implement the current findings.

Very truly yours,

*James J. Horan*

James J. Horan

Incl

as stated

James J. Horan  
Division of Water Resources  
New Jersey Department of Environmental Protection

cc'd to:

Mr. Dick G. Norton, P.E., Dept. of Environmental Protection  
Division of Water Resources  
N.J. Dept. of Environmental Protection  
P.O. Box CN021  
Trenton, NJ 08625

Mr. John O'Donnell, Acting Director  
Bureau of Flood Plain Regulation  
Division of Water Resources  
N.J. Dept. of Environmental Protection  
P.O. Box CN021  
Trenton, NJ 08625

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4. The polyvalent and spent metal to be determined by a qualified plating firm consisting of one or two men using their sophisticated methods, procedures and apparatus within six months from the date of approval of this proposal. A suitable method of the contractor's plating firm should be submitted to the Bureau for review and approval. In the interim, a suitable emergency operation plan and warning system should be prepared, tested, and during periods of unusual heavy precipitation, around the clock surveillance should be provided.

On the other hand, the lack of improvement may be reported by the patients as a failure of the treatment.

<sup>24</sup> See, for example, the discussion of the 1992 Constitutional Convention in the *Constitutional Convention of 1992: The Final Report* (1993).

<sup>12</sup> See, for example, *U.S. v. Ladd*, 100 F.3d 1250, 1254 (11th Cir. 1996) (noting that the term "commercial" is not defined in the statute).

It is the responsibility of the author to make sure that the information given in the text, tables, figures, and references is appropriate and accurate and to inform the editor of any changes to the original manuscript.

and the mean value of the total energy and the charge per unit area separately, derived from the model.

Fig. 10. A typical example of a subbankment with appropriate anterior.

... the owner must develop written operating procedures and a performance plan and submit it to the state within one year from the date of application.

A. T. H. V. T. S.

### KUNNERS, MOSER

Major, Corps of Engineers  
acting District Engineer

9. *Phalaenopsis*

DELAWARE RIVER BASIN  
TRIBUTARY ALEXAUKEN CREEK, HUNTERDON COUNTY  
NEW JERSEY

SCHILLER POND DAM

( NJ00153 )

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

1411

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS  
PHILADELPHIA, PENNSYLVANIA 19106

MAY, 1981

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

Name: Schiller Pond Dam, I.D. NJ 00153  
State Located: New Jersey  
County Located: Hunterdon County  
Stream: Tributary Alexanken Creek  
River Basin: Delaware River  
Date of Inspection: January 13, and February 3, 1981

Assessment of General Conditions

Schiller Pond Dam is an earthfill dam with a concrete drop inlet, the main spillway, in the center of the dam. In addition there is an auxiliary spillway at the right end of the dam. The overall condition of the dam is good. There are no signs of distress or instability in the embankment. The downstream channel is well defined and in good condition. The low-level outlet was not opened and is not used. The hazard potential is rated as "high".

Schiller Pond Dam is considered inadequate in view of its lack of spillway capacity to pass the SDF (1/2 PMF) without overtopping the dam. The spillway is capable of passing a flood equal to 35 percent of the PMF (70 percent of the 1/2 PMF), and is assessed as "inadequate".

At present, the engineering data available is not sufficient to make a definitive statement on the stability of the dam, but based on the findings of the visual inspection, the preliminary assessment of static stability is that it is satisfactory. The following actions are recommended along with a timetable for their completion. All recommended actions should be conducted under the supervision of an Engineer who is experienced in the design, construction and inspection of dams.

1. Carry out a more precise hydrologic and hydraulic analysis of the dam within twelve months, to determine the need and type of mitigating measures necessary. Based on the results of these studies, remedial measures should be instituted. This should include the installation of a tailwater gage.
2. Construct a concrete headwall and apron at the outlet end of the discharge pipe within twelve months.

3. The trees should be removed from the embankment slopes to avoid problems that may develop from roots. The area should then be seeded to develop a growth of grass for surface erosion protection. This should be done within twelve months.
4. Determine if the low-level outlet gate is operable, and if not institute remedial action to make it operable within twelve months.
5. The owner should develop an emergency action plan (if one is not already available) outlining actions to be taken by the operator to minimize downstream effects of an emergency and establish a flood warning system for the downstream communities within three months.

Furthermore, while of a less urgent nature, the following additional action is recommended and should be carried out within twelve months.

The owner should develop, within one (1) year after formal approval of the report, written operating procedures and a periodic maintenance plan to insure the safety of the dam.



John P. Talerico, P.E.  
HARRIS-ECI ASSOCIATES



Photo taken January 13, 1981

S C H I L L E R P O N D D A M

View of dam looking towards the auxiliary spillway.  
Main spillway is drop inlet in right center of photo.

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

SCHILLER POND DAM, I.D. NJ 00153

SECTION 1

1. PROJECT INFORMATION

1.1 General

a. Authority

The National Dam Inspection Act (Public Law 92-367, 1972) provides for the National Inventory and Inspection Program by the U.S. Army Corps of Engineers. This inspection was made in accordance with this authority under Contract C-FPM No. 35 with the State of New Jersey who, in turn, is contracted to the Philadelphia District of the Corps of Engineers, and was carried out by the engineering firm of Harris-ECI Associates of Woodbridge, New Jersey.

b. Purpose of Inspection

The visual inspection of Schiller Pond Dam was made on January 13 and February 3, 1981. The purpose of the inspection was to make a general assessment as to the structural integrity and operational adequacy of the dam embankment and its appurtenant structures.

c. Scope of Report

The report summarizes available pertinent data relating to the project; presents a summary of visual observations made during the field inspection; presents an evaluation of hydrologic and hydraulic conditions at the site; presents an evaluation as to the structural adequacy of the various project features; and assesses the general condition of the dam with respect to safety.

## 1.2 Description of Project

### a. Description of Dam and Appurtenances

Schiller Pond Dam is an earthfill dam approximately 300 feet long and 18.5 feet high with a clay cut off trench. There are two spillways, an 8-foot by 6 foot concrete drop inlet which is the main spillway and a 60 foot wide grass covered auxiliary spillway. The auxiliary spillway, which was constructed by excavating the existing ground, is located at the right end of the dam. Its crest is 4.0 feet below the top of the embankment. The drop inlet is located approximately 150 feet from the left edge of the auxiliary spillway and its crest is 6.5 feet below the top of the embankment.

There is a wire screen on top of the inlet to keep the trout from going into the discharge during high pond levels. The flow from the drop inlet discharges into the downstream channel through a 72-inch corrugated metal pipe, which has two anti-seep collars extending three feet beyond the outside of the pipe. The flow from the auxiliary spillway runs perpendicular to the dam along the discharge channel for approximately 80 feet and then flows to the left along the existing ground to the downstream channel.

The embankment has a top width of 10 feet with a 3H:1V slope on the upstream face and approximately a 4H:1V slope on the downstream face.

The low-level outlet consists of a 72-inch corrugated metal pipe that carries the flow from the main spillway. The low-level flow into the pipe is controlled by a 18-inch valve located on the upstream wall of the inlet. The valve is operated manually by a removable hand crank that fits into a small iron pipe attached to the face of the inlet.

The outlet end of the pipe discharges into the downstream channel approximately 80 feet from the inlet. The channel starts at the discharge outlet and continues downstream for a distance of 600 feet where it crosses under the Pocktown-Lambertville Road through a 14 foot x 8 foot opening.

A generalized description of the soil conditions is contained in Report No. 6, Hunterdon County, Engineering Soil Survey of New Jersey, by Rutgers University. The report dated 1952, indicates the area of the dam and pond to be stratified recent alluvium, with the surrounding area being diabase bedrock.

Recent alluvium can be described as materials usually assort by water action and ranging in size from silt with some clay, to silt and fine sand with gravel. Diabase is described as hard, non-homogeneous rock commonly identified as trap rock with variable overlaying depths of silts and silty clays with frequent gravelly phases. Geologic Overlay Sheet 27 classifies the underlaying rock as diabase.

b. Location

Schiller Pond Dam is located on a tributary of Alexauken Creek, in the Township of West Amwell, Hunterdon County, New Jersey. The dam is accessible from Route 179 at Mount Airy by way of Mill Road to Rocktown-Lambertville Road.

c. Size Classification

According to the "Recommended Guidelines for Safety Inspection of Dams" by the U.S. Department of the Army, Office of the Chief Engineers, the dam is classified in the dam size category as being "small", since its storage volume of 73 acre-feet is less than 1,000 acre-feet. The dam is also classified as "small" because its height of 18.5 feet is less than 40 feet. The overall size classification of Schiller Pond Dam is "small".

d. Hazard Classification

A hazard potential classification of "high" was assigned to Schiller Pond Dam on the basis that there are more than a dozen homes located on both sides of the stream downstream of the Rocktown-Lambertville Road. Therefore the possibility exists of the loss of more than a few lives in the event of a hypothetical failure of the dam.

e. Ownership

Schiller Pond Dam is owned by:

Mr. William Schiller  
R.D.I., Box 350  
Hopewell, NJ 08525  
(609) 466-1687

f. Purpose

Schiller Pond Dam was originally constructed for irrigation but is presently used for recreational purposes only. The pond is stocked every year with trout by a fishing club.

g. Design and Construction History

Schiller Pond Dam was designed by the U.S. Soil Conservation Service. The permit to construct the dam was issued on September 3, 1959 with the dam being completed in November 1960.

h. Normal Operating Procedures

The discharge from the lake is unregulated and allowed to naturally balance the inflow into the lake. According to the owner the low-level outlet is not used due to the pond being heavily stocked with trout.

1.3 Pertinent Data

a. Drainage Area

1.37 sq. mi.

b. Discharge at Dam Site

Ungated spillway capacity at elevation of top of dam: 2,207 (311.50 NGVD)

Total spillway capacity at maximum pool elevation (SDF): 3,324 (312.3 NGVD)

c. Elevation (Feet above NGVD)

Top of dam: 311.5

Maximum pool design surcharge (SDF): 312.3

Recreation pool: 305

Spillway crest: Main: 305  
Auxiliary: 307.5

Streambed at centerline of dam: 293 (Estimated)

Maximum tailwater: 296 (Estimated)

d. Reservoir

Length of maximum pool: 1,900 ft. (Estimated)

Length of recreation pool: 1,200 ft. (Estimated)

e. Storage (acre-feet)

Spillway Crest: 18

Top of dam: 73

Maximum pool (SDF): 83

f. Reservoir Surface (acres)

Top of dam: 11.5 (Estimated)

Maximum pool (SDF): 11.6 (Estimated)

Recreation pool: 5.5

Spillway crest: 5.5 (305 NGVD)

g. Dam

Type: Earthfill with concrete drop inlet

Length: 220 ft. (Effective)

Height: 18.5 ft.

Top width: 10 ft.

Side slopes - Upstream: 3H:1V

- Downstream: 4H:1V

Zoning: Unknown

Impervious core: None

Cutoff: 200 ft. clay cut-off

Grout curtain: None

h. Diversion and Regulating Tunnel

i. Spillway

Type: Main: Concrete drop inlet

Auxiliary: Earth Channel

Length of weir: Main: 28 ft.

Auxiliary: 60 ft.

Crest elevation: Main: 305 NGVD

Auxiliary: 307.5 NGVD

Gates:

U/S Channel: Main: Schiller Pond

D/S Channel: Auxiliary: Natural Channel

Auxiliary: Existing ground.

j. Regulating Outlets

Low level outlet: 72-inch C.M.P.

Controls: Manually controlled 18-inch valve.

Emergency gate: None

Outlet: 294. NGVD

## SECTION 2

### 2. ENGINEERING DATA

#### 2.1 Design

Drawings and specifications for the construction of the Schiller Pond Dam are available in the files of NJ Department of Environmental Protection (NJ-DEP) in Trenton and also at the offices of the U.S. Department of Agriculture - Soil Conservation Service (SCS) in Somerset N.J. The structural design data of the spillway as well as the hydrology and hydraulic data for 25-year and 50-year design storm is available at the above locations. One drawing shows the location of and data obtained from tests pits taken along the dam. Soil test results, design computations and other geotechnical data needed to assess the stability properly are not available.

#### 2.2 Construction

Data is not available concerning the as-built construction of the dam. No data exists of construction methods, borrow sources or other data pertinent to the construction of the dam.

#### 2.3 Operation

Formal operation records are not kept for the dam and reservoir. The pond is allowed to operate naturally without regulation.

#### 2.4 Evaluation

##### a. Availability

The availability of engineering data is good. The construction plans and specifications for the dam are available from the NJ-DEP and the SCS.

##### b. Adequacy

The engineering data available from the plans and from the field was adequate to perform hydrologic and hydraulic computations. The data was insufficient to perform stability analysis, but a preliminary evaluation could be made based on visual observations.

##### c. Validity

The information contained in the drawings and checked by limited field measurements appears to be valid except downstream slope of the embankment measured 4H:1V instead of 2H:1V as shown on the plans.

## SECTION 3

### 3. VISUAL INSPECTION

#### 3.1 Findings

##### a. General

The visual inspection of Schiller Pond Dam revealed the dam and spillways to be in good condition. At the time of the inspection the pond level was just above the crest of the main spillway.

##### b. Dam

The earth embankment appears sound. No surface cracking on the embankment or at the toe was noticed. No sloughing or erosion of the embankment was observed. The vertical and horizontal alignments of the crest are good. A group of four evergreen trees are growing on the embankment at the junction with the left end of the auxiliary spillway. There is also one small tree growing at the water's edge left of the main spillway. No evidence of burrowing by animals was observed.

##### c. Appurtenant Structures

###### 1. Spillways

The main spillway is a concrete drop inlet with an 18-inch valve. Wire fencing supported by iron pipes covers the top of the inlet to prevent the trout from going through the discharge pipe during high pond levels. The inlet is in good condition. The auxiliary spillway is grass covered and in good condition. Horizontal and vertical alignments of the auxiliary spillway are good.

###### 2. Outlet Works

The low-level outlet works is also the main spillway. It consists of a drop inlet with a 18-inch valve attached to the front face of the inlet, and a 72-inch corrugated metal pipe that carries the flow to the downstream channel. The valve is operated by a removable hand crank. The outlet is in good condition. There is no headwall at the outlet end of the pipe. The riprap slope along the sides of the pipe is missing.

There is some minor slope erosion along the sides of the pipe, and immediatley downstream along the right bank.

d. Reservoir Area

The reservoir's side slopes are flat to moderate. There are some trees along the left shore line and a evergreen nursery on the back slope. Lakeside Road runs along the right shoreline. There is no indication of slope instability.

e. Downstream Channel

The downstream channel is in good condition. It is a well defined channel that starts at the outlet and then parallels Lakeside Road until it crosses under the Rocktown-Lambertville Road 600 feet downstream. The banks are wooded and shallow with the surrounding area relatively flat. Downstream of Rocktown-Lambertville Road there are houses on both sides of the stream.

## SECTION 4

### 4. OPERATIONAL PROCEDURES

#### 4.1 Procedures

Schiller Pond Dam is used to impound water for recreational activities. The level of the lake is maintained through the unregulated flow over the spillway.

#### 4.2 Maintenance of the Dam

There is no regular inspection and maintenance program for the dam and appurtenant structures. Mr. William Schiller is responsible for the maintenance of the dam.

#### 4.3 Maintenance of Operating Facilities

The low-level outlet operating facilities consist of the one manually operated 18-inch valve. Operation of the valve was not satisfactorily demonstrated as the hand crank was not available.

#### 4.4 Evaluation

The present operational and maintenance procedures are fair with the dam and spillway being maintained in a serviceable condition.

## SECTION 5

### 5. HYDRAULIC/HYDROLOGIC

#### 5.1 Evaluation of Features

##### a. Design

The drainage area above Schiller Pond Dam is approximately 1.37 square miles. A drainage map of the water shed of the dam site is presented on Plate 1, Appendix D.

The topography within the basin is generally moderately sloped. Elevations range from approximately 473 feet above NGVD at the northwest end of the watershed to about 305 feet at the dam site. Land use patterns within the watershed are mostly woodland.

The evaluation of the hydraulic and hydrologic features of the dam was based on criteria set forth in the Corps guidelines and additional guidance provided by the Philadelphia District, Corps of Engineers. The SDF for the Dam falls in a range of 1/2 PMF to PMF. In this case, the low end of the range, 1/2 PMF, is chosen since the factors used to select size and hazard classification are on the low-side of their respective ranges.

The Probable Maximum Flood (PMF) was calculated from the probable maximum precipitation using Hydrometeorological Report No. 33 with standard reduction factors. Due to the small drainage area, the SCS triangular hydrograph transformed to a curvilinear hydrograph was adopted for developing the unit hydrograph, with the aid of the HEC-1-DB Flood Hydrograph Computer Program.

Initial and constant infiltration loss rates were applied to the Probable Maximum Precipitation to obtain rainfall excesses. The rainfall excesses were applied to the unit hydrograph to obtain the PMF and various ratios of PMF utilizing program HEC-1-DB.

The SDF peak outflow calculated for the dam is 3,324 cfs. This value is derived from the half PMF, and results in overtopping of the dam, assuming that the lake was originally at the spillway crest elevation.

The stage-outflow relation for the spillway was determined from the geometry of the spillway and dam utilizing HEC-1 Dam Safety Version program.

The reservoir stage-storage capacity relationship was computed directly by the conic method, utilizing the HEC-1-DB program. The reservoir surface areas at various elevations were measured by planimeter from a U.S.G.S. Quadrangle topographic map. Reservoir storage capacity included surcharge levels exceeding the top of the dam, and the spillway rating curve was based

on the assumption that the dam remains intact during routing. The spillway rating curve is presented in the Hydrologic Computation, Appendix D.

A breach analysis indicates that the stage of the stream where it crosses Rocktown - Lambertville Road is 0.6 feet higher, due to dam failure from overtopping at 0.4 PMF than it would be without failure at 0.4 PMF. This is likely not to jeopardize the well traveled road downstream significantly more than without failure. The discharge facility is thus rated "inadequate".

Drawdown calculations indicate that to empty the lake to an elevation of 299.5 NGVD through the one low-level outlet would take 20 hours, assuming a 2 cfs/square mile inflow. This is not considered to be an excessive drawdown period, and provision of additional outlets should not be considered.

b. Experience Data

No records of reservoir stage or spillway discharges are maintained for this site.

c. Visual Observation

The downstream channel is in good condition. It parallels Lakeside Road until the channel crosses under Rocktown-Lambertville Road 600 feet downstream of the dam. The banks are shallow and wooded. Downstream of Rocktown-Lambertville Road, there are houses on both sides of the stream.

The side slopes of the reservoir are flat to moderate with no signs of instability. The drainage area is primarily wooded and undeveloped.

d. Overtopping Potential

A storm of magnitude equivalent to the SDF would cause overtopping of the dam to a height of 0.8 feet. Computations indicate that the dam can pass approximately 35 percent of the PMF without overtopping the dam crest. Since the 1/2 PMF is the Spillway Design Flood (SDF) for this dam, according to the Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers, the spillway capacity of the dam is assessed as "inadequate".

## SECTION 6

### 6. STRUCTURAL STABILITY

#### 6.1 Evaluation of Structural Stability

##### a. Visual Observations

There are no signs of distress in the embankment of the Schiller Pond Dam. The trees growing on the embankment at the junction with the auxiliary spillway could pose a threat to stability. The spillways are in good condition.

##### b. Design and Construction Data

No design computations relating to stability were uncovered during the report preparation phase. No embankment or foundation soil parameters are available for carrying out a conventional stability analysis of the embankment.

##### c. Operating Records

No operating records are available relating to the stability of the dam.

##### d. Post-Construction Changes

There are no known post-construction changes since the dam was built in 1960.

##### e. Static Stability

A static stability analysis was not performed for Schiller Pond Dam because the lack of data on which to base assumptions of material properties within embankment zones might produce misleading results, but based on the findings of the visual inspection, the preliminary assessment of static stability is that it is satisfactory.

##### f. Seismic Stability

The dam is located in Seismic Zone 1, as defined in Recommended Guidelines for Safety Inspection of Dams, prepared by the Corps of Engineers. In general, projects located in Seismic Zones 0, 1 and 2 may be assumed to present no hazard from earthquake, provided the static stability conditions are satisfactory and conventional safety margins exist, and based on the findings of the visual inspection, the preliminary assessment of the static and seismic stabilities is that they are satisfactory.

## SECTION 7

### 7. ASSESSMENT/REMEDIAL MEASURES

#### 7.1 Dam Assessment

##### a. Safety

The dam has been inspected visually and a review has been made of the available engineering data. This assessment is subject to the limitations inherent in the visual inspection procedures stipulated by the Corps of Engineers for a Phase 1 report.

Schiller Pond Dam is inadequate because the dam does not have the spillway capacity to pass the SDF, one half of the PMF, without overtopping. Overtopping of the dam carries with it the danger of a likely progressive failure of the dam. The present spillway capacity of the dam is approximately 35 percent of the PMF.

No definitive statement pertaining to the safety of the embankment can be made without acquisition of embankment material engineering properties, but based on the findings of the visual inspection, preliminary assessment of the static stability is that it is satisfactory.

##### b. Adequacy of Information

The information uncovered was adequate to perform hydrologic and hydraulic computations. The data was insufficient to perform even an approximate computation of the stability of the dam. A preliminary assessment of the dam could be made by visual observation only.

##### c. Urgency

The remedial measures and recommended actions along with a timetable for their completion are detailed below. All recommended action should be conducted under the supervision of an engineer who is experienced in the design, construction and inspection of dams.

#### 7.2 Remedial Measures

##### a. Alternatives for Increasing Spillway Capacity

Alternatives for increasing spillway capacity are as follows:

1. Increase the embankment height of the dam thus permitting a higher discharge to pass.

2. Lower the spillway crest elevation.
3. Increase the effective spillway crest length.
4. A combination of any of the above alternatives.

b. Recommendations

1. Carry out a more precise hydrologic and hydraulic analysis of the dam within twelve months, to determine the need and type of mitigating measures necessary. If required, conduct a study of the means of increasing spillway discharge capacity and develop alternative schemes for construction. This should include the installation of headwater and tailwater gages. The ability of the dam to withstand overtopping should also be studied.
2. Construct a concrete headwall and apron at the outlet end of the discharge pipe within twelve months.
3. Remove the trees from the embankment slopes to avoid problems from roots. The area should then be seeded to develop a growth of grass for surface erosion protection. This should be done within twelve months.
4. Determine if the low-level outlet is operable, and if not institute remedial action to make it operable within twelve months.

The following additional action is recommended:

The owner should develop an emergency action plan (if one is not already available) outlining actions to be taken by the operator to minimize downstream effects of an emergency and establish a flood warning system for the downstream communities within three months.

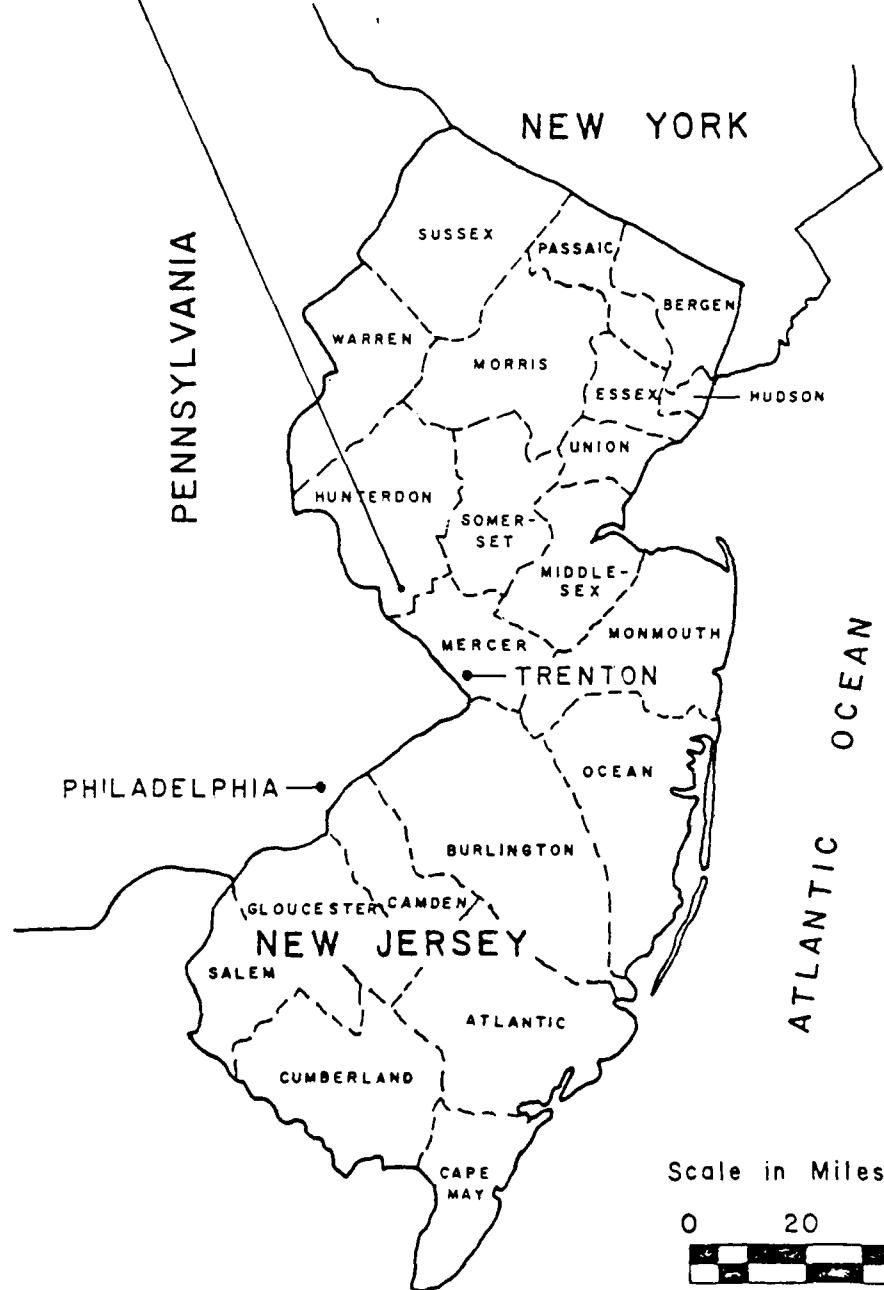
c. O & M Procedures

The owner should develop, within one (1) year after formal approval of the report, written operating procedures and a periodic maintenance plan to insure the safety of the dam.

PLATES .

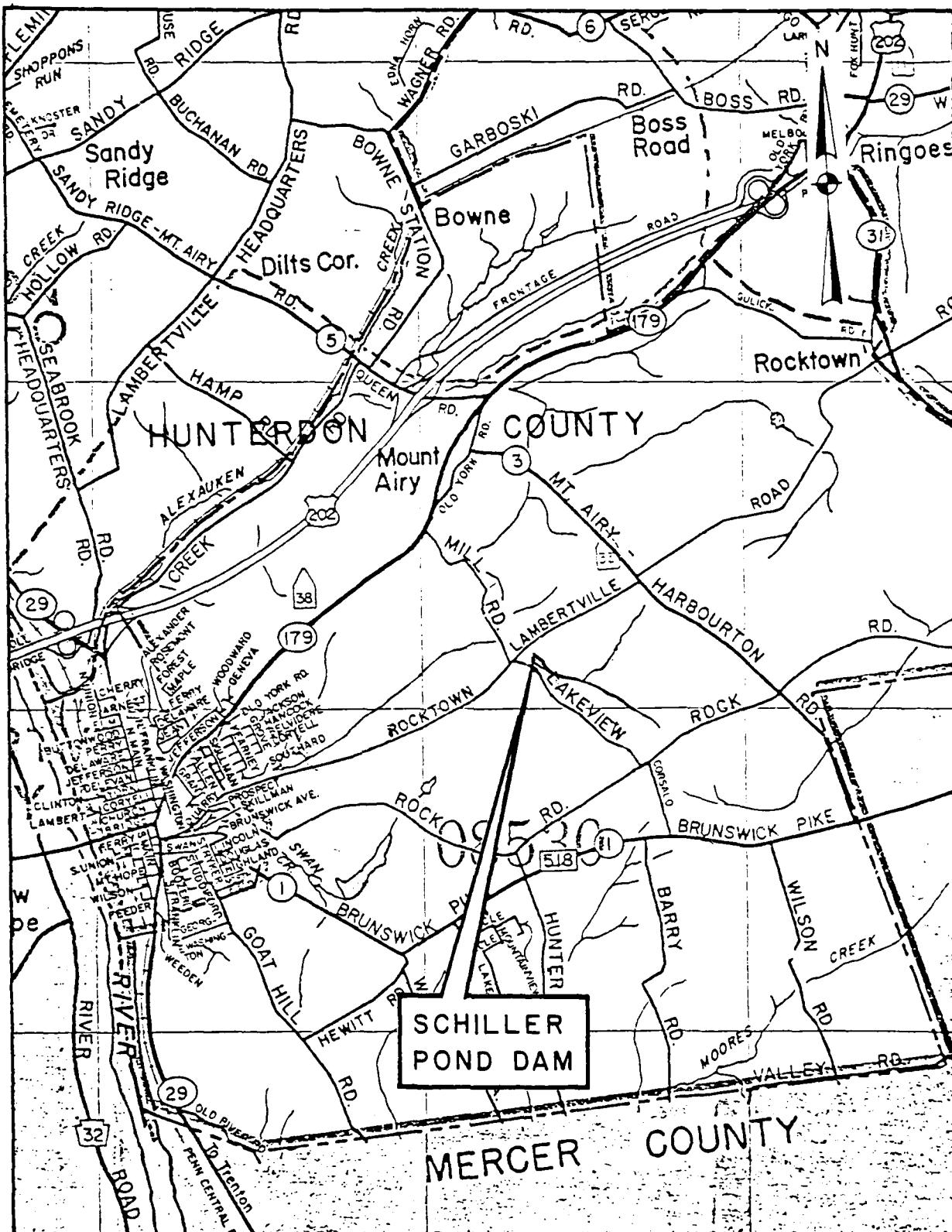
## SCHILLER POND DAM

WEST AMWELL TWP.  
HUNTERDON CO., N. J.



KEY MAP

PLATE I

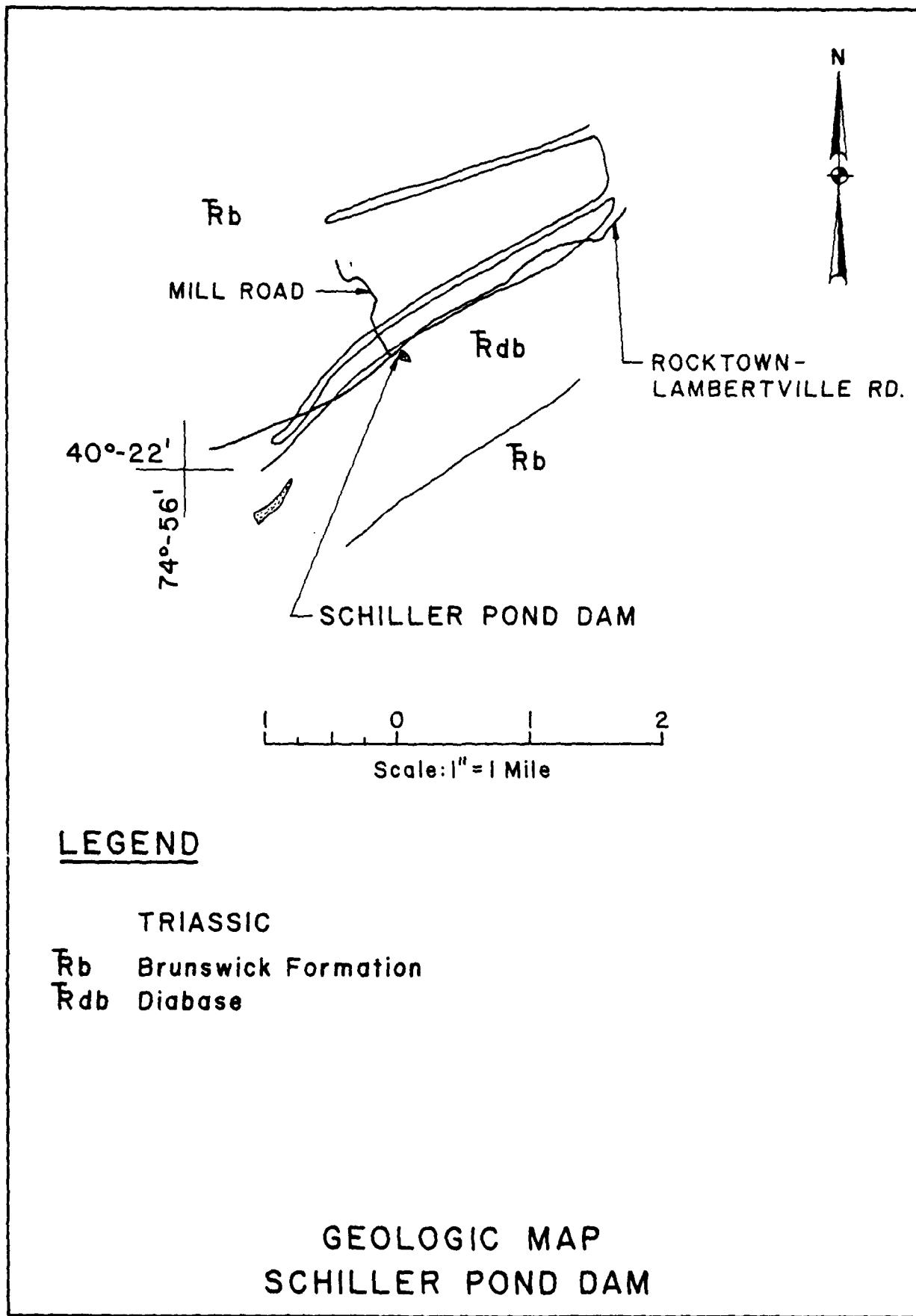


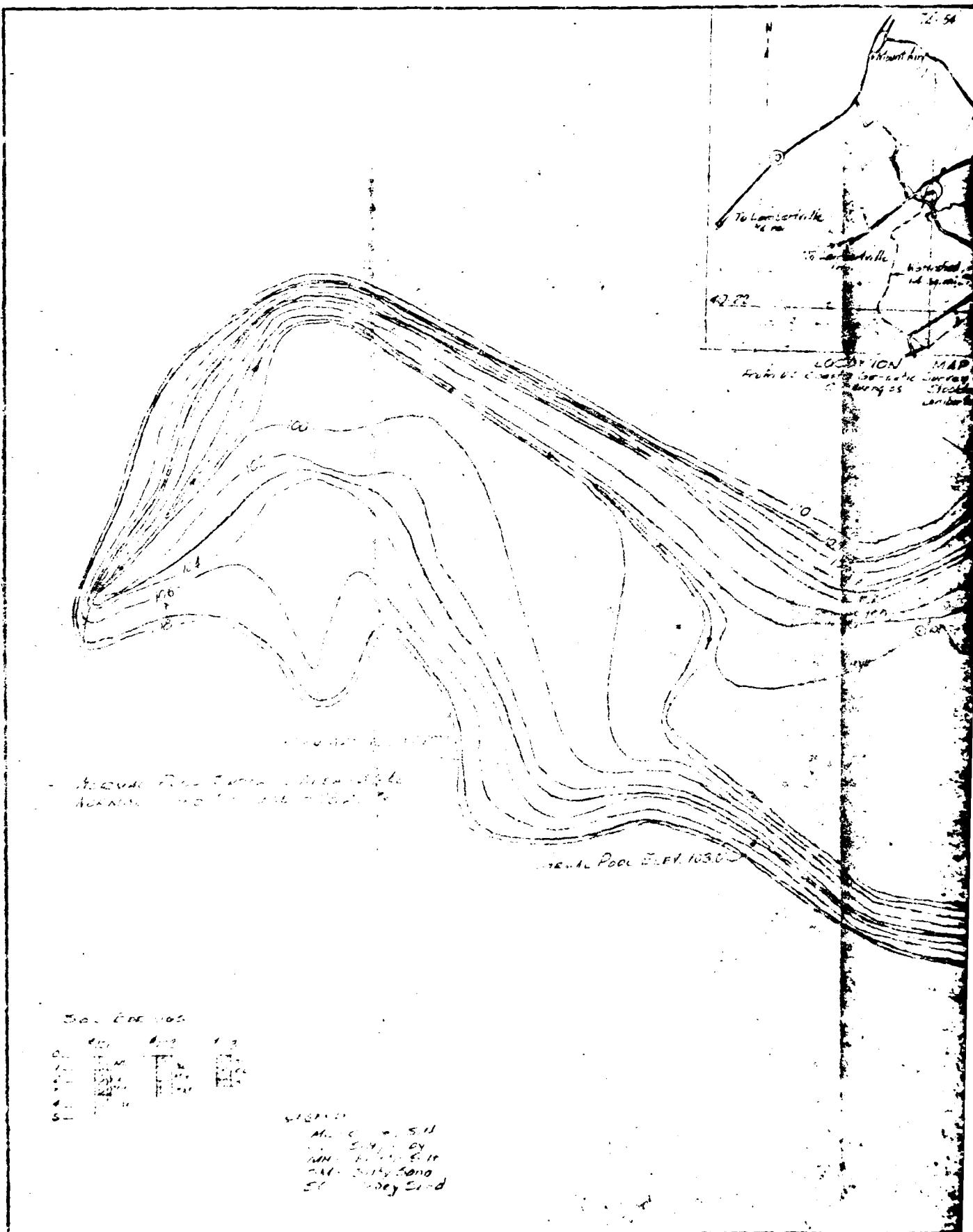
Scale in Miles (Approx.)

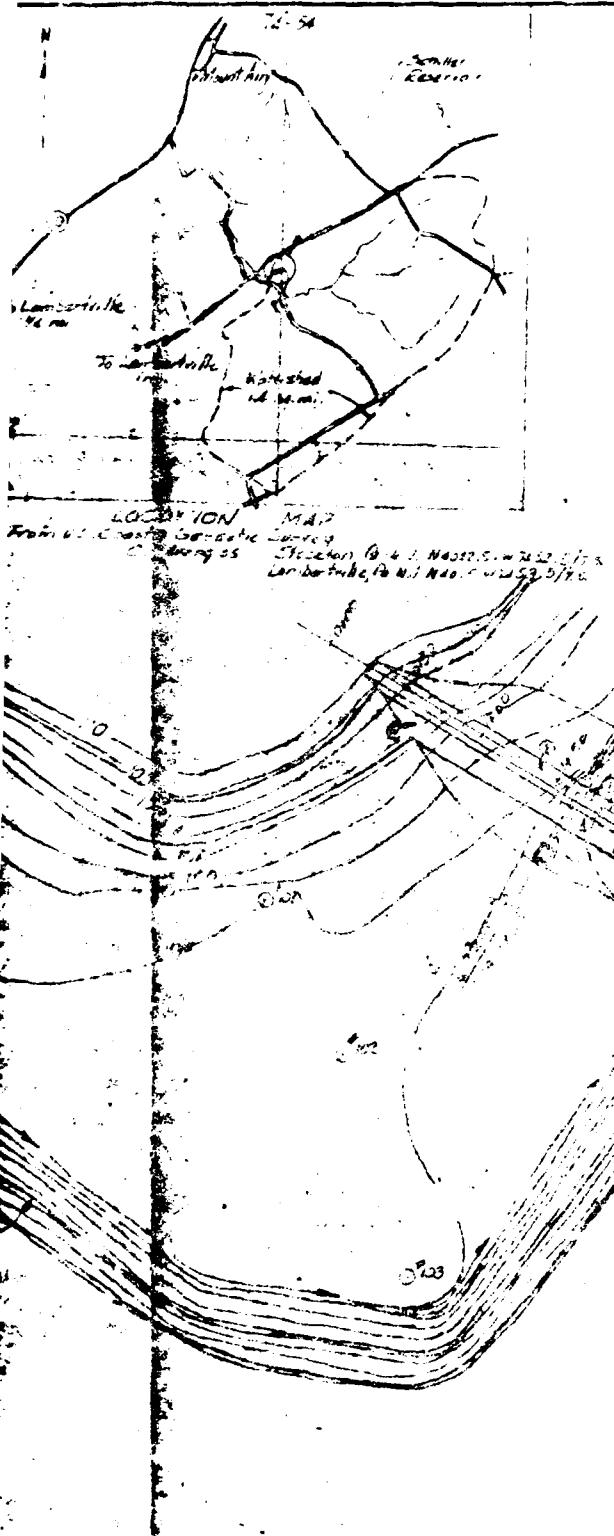
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VICINITY MAP

PLATE 2







EM 7  
Loc. of cement in gravel  
beds on construction of  
40' x 60' canal and dam, and  
the outlet of the canal.

FILE  
DAM APPLICATION NO. 532  
SEP 3 1959  
F. J. Shanks  
DAM APPLICATION NO. 532

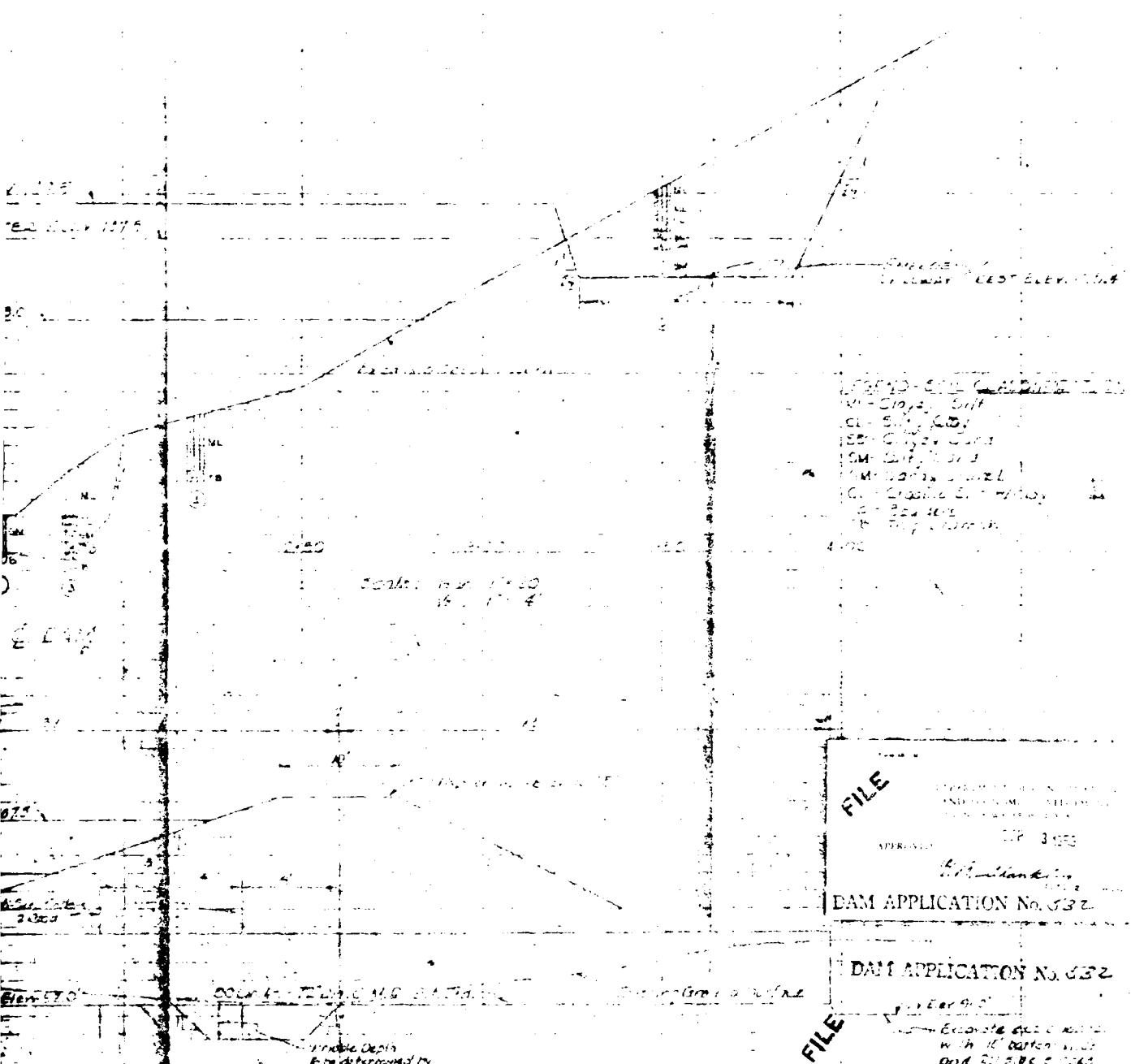
FILE

NAME	ADDRESS

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

FILE





## SECTION ON THE SPILLING-OUT SPILL-WAY

- Variable Depth  
to be determined by  
Engineer in the field
- Approximate the water  
depths

DATA APPLICATION NO. 632

DAM APPLICATION No. 532

FILE

116

LEER IRRIGATION & CONCRETE  
PLATE DRIFTER  
HUNTERSON CONCRETE

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

1/2" from edge  
do not  
ALWAYS SEE  
NOT

See  
do not  
ALWAYS SEE  
NOT

in face

Sec

ALWAYS SEE  
NOT

2-5

12' Cor. dard

1/2" from edge of upper board, 10" from  
edge, 10" from bottom edge

ANTI-SEE-THROUGH COLLAR (12043)  
10' to 6' 6"

Design: A

NOTE  
1/2" Cor. dard. 6' 6" x 12' 6" (10' to 6' 6")  
Nylon on bottom 10"

WAN	LEN	WAN	LEN
6	1	6	1
4:8	1	26.24	1
4:6	1	216.00	1
4:7	5:7	284.76	1
3:10	1	17.60	1
9:7	1:8	11.15	1
		9.67	1
		200.00	1
		500.26	1
		104.00	1
		313.30	1
		.. .00	1

2-6 TRUCK

2-6

After

DAM APPLICATION NO. 6301

FILE

DAM APPLICATION NO. 6301

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

APPENDIX A  
CHECK LIST - VISUAL OBSERVATIONS  
CHECK LIST - ENGINEERING, CONSTRUCTION  
MAINTENANCE DATA

CHECK LIST  
VISUAL INSPECTION  
PLEASE 1

Name Dam Schiller Pond Dam County Hunterdon State New Jersey Coordinators NJ-DEP

Date(s) Inspection January 13, 1981 Weather Clear Temperature 0° F  
February 3, 1981 Clear 10° F

Pool Elevation at Time of Inspection 305 NGVD Tailwater at Time of Inspection 294.5 NGVD

Inspection Personnel:  
January 13, 1981

William Birch  
Thomas Moroney  
Joseph Sirianni (Recorder)

OWNER/REPRESENTATIVE:

January 13, 1981  
William Schiller  
R.D.I., Box 350  
Hopewell, NJ 08525

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
SURFACE CRACKS		
	None noticed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE		
	None noticed.	
SLoughing or erosion of embankment and abutment slopes		
	Some minor erosion on the downstream slope by the outlet pipe.	
VERTICAL & HORIZONTAL ALIGNMENT OF THE CREST		
	Horizontal and vertical alignments appear good.	
RIPRAP FAILURES		
	None	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
EARTH EMBANKMENT	Embankment is grass covered and in good condition. A small clump of evergreen trees growing at the junction of the embankment with the left end of the auxiliary spillway. One small tree growing at edge of the pond left of drop inlet.	Remove trees.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Junction of the embankment with the auxiliary spillway is in good condition.	
ANY NOTICEABLE SEEPAGE		
	None noticed.	
STAFF GAGE AND RECORDER		
	None.	
DRAINS		
	None.	

OUTLET WORKS	OUTLET WORKS	REMARKS AND RECOMMENDATIONS
VISUAL EXAMINATION OF	OBSERVATIONS	
CRACKING & SPALLING OF CONCRETE SURFACES IN STILLING BASIN		
N/A - Main spillway (also outlet works) discharges directly into the downstream channel. Auxiliary spillway discharges onto existing ground and then into the downstream channel.		
INTAKE STRUCTURE		
Main spillway is concrete drop inlet with a valve and is in good condition.		
N/A - Auxiliary spillway.		
OUTLET STRUCTURE		
A 72-inch corrugated metal pipe in good condition. There is no headwall at outlet end of pipe. Rirrap of slope along sides of pipe is missing. There is minor erosion of slope on sides of pipe. Valve was not opened as hand crank was missing. Owner stated valve not used due to pond being stocked with trout.	Provide concrete headwall and apron. Determine if low-level outlet gate is operable.	
OUTLET FACILITIES		
None.		
EMERGENCY GATE		
None		

VISUAL EXAMINATION OF	UNGATED SPILLWAY	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
CONCRETE WEIR		Main spillway is a concrete drop inlet with a valve. The spillway is in good condition. Auxiliary spillway is a grass channel.	
APPROACH CHANNEL		The pond is the approach channel for both spillways.	
DISCHARGE CHANNEL		Main spillway: 72-inch corrugated metal pipe, in good condition, is the discharge channel and low-level outlet.	
Auxiliary spillway:		Grass covered channel in good condition.	
BRIDGE AND PIERS		N/A	

INSTRUMENTATION

VISUAL EXAMINATION OF MONUMENTATION/SURVEYS	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
OBSERVATION WELLS		
None.		
WEIRS		
None.		
PIEZOMETERS		
None.		
OTHER		
None.		

## RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
SLOPES	The slopes are flat to moderate. There are some trees growing along the left shore and a evergreen nursery on the back slope. There is no indication of slope instability.	
SEDIMENTATION	None observed. Pond covered with ice.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	OBSERVATIONS	REMARKS AND RECOMMENDATIONS
Channel in good condition well define with no debris.		
SLOPES Slopes of channel are about 2-feet high, steep and wooded. Surrounding area of channel is flat. Minor erosion of right bank just downstream of the outlet pipe.		
APPROXIMATE NUMBER OF HOMES AND POPULATION There are more than a dozen houses both sides of the downstream channel after it crosses under Rocktown-Lambertville Road approximately 600 feet downstream of the dam.		

CHECK LIST  
 ENGINEERING DATA  
 DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	Available on microfilm at NJ Department of Environmental Protection (NJ-DEP), 1474 Prospect Street, P.O. Box CN-029, Trenton, NJ 08625 Available at U.S. Department of Agriculture Soil Conservation Service (SCS) 1370 Hamilton Street, Somerset, NJ 08873
REGIONAL VICINITY MAP	Available. Hunterdon County Map and U.S.G.S. Quadrangle sheet for Stockton, N.J.
CONSTRUCTION HISTORY	No formal history exists, but can be deduced from available microfilm at NJ-DEP.
TYPICAL SECTIONS OF DAM	Available on microfilm at NJ-DEP and SCS files.
HYDROLOGIC/HYDRAULIC DATA	Limited data available at NJ-DEP and SCS files.
OUTLETS - PLAN	Available on microfilm, NJ-DEP and SCS files.
- DETAILS	Available on microfilm, NJ-DEP and SCS files.
- CONSTRAINTS	None.
- DISCHARGE RATINGS	Not available.
INFILTRATION / RESERVOIR RECORDS	Not available.

CHECK LIST  
 ENGINEERING DATA  
 DESIGN, CONSTRUCTION, OPERATION  
 (continued)

ITEM	REMARKS
GEOLOGY REPORTS	Available U.S.G.S. Geologic Overlay Sheet for Hunterdon County and Engineering Soils Survey of New Jersey, Report No. 6 - Hunterdon County, by Rutgers University (New Brunswick, NJ).
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Limited data available on microfilm, NJ-DEP and SCS files. None available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Test pit results available on microfilm, NJ-DEP and SCS files. None available.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	Unknown.
STILLWAY PLAN - SECTIONS - DETAILS	Available on microfilm, NJ-DEP and SCS files.

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
(continued)

REMARKS

ITEM

OPERATING EQUIPMENT  
PLANS AND DETAILS

None available.

MONITORING SYSTEMS

None available.

EDUCATIONS

None

HIGH POOL RECORDS

Not kept.

POST CONSTRUCTION ENGINEERING  
STUDIES AND REPORTS

None

PRIOR ACCIDENTS OF FAILURE  
OF BM - DESCRIPTION  
- REPORTS

None known to exist.

MAINTENANCE OPERATION  
RECORDS

None known to exist.

APPENDIX B

PHOTOGRAPHS

SCHILLER POND DAM



Photo 1 - View of dam taken from right bank of auxiliary spillway. Note clump of trees on embankment in right of photo. (Photo taken on January 13, 1961.)

SCHILLER POND DAM



Photo 2 - View of discharge channel of auxiliary spillway.  
(Photo taken on January 13, 1981.)



Photo 3 - View of downstream slope looking towards left end of dam. Note low-level outlet pipe in the lower right. (Photo taken on February 3, 1981.)

SCHILLER POND DAM



Photo 4 - View of upstream slope of dam looking towards the right end. (Photo taken on January 13, 1981.)

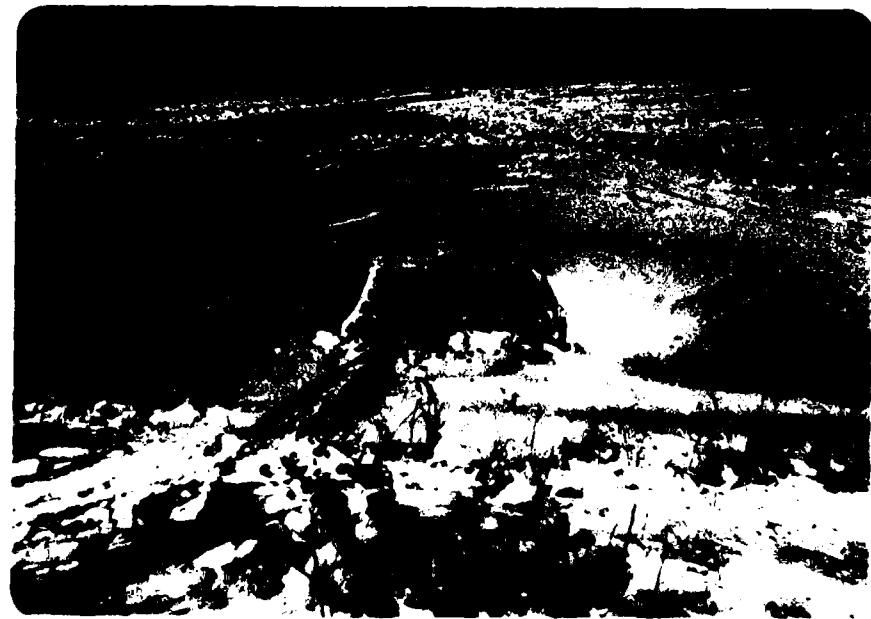


Photo 5 - View of drop inlet (main spillway) and pond from the top of the embankment. (Photo taken on January 13, 1981.)

SCHILLER POND DAM



Photo 6 - View of downstream channel and outlet pipe from top of the embankment. (Photo taken on January 13, 1981.)



Photo 7 - View of 72-inch C.M.P. outlet pipe. Note minor erosion on sides of pipe. (Photo taken on February 3, 1981.)

SCHILLER POND DAM

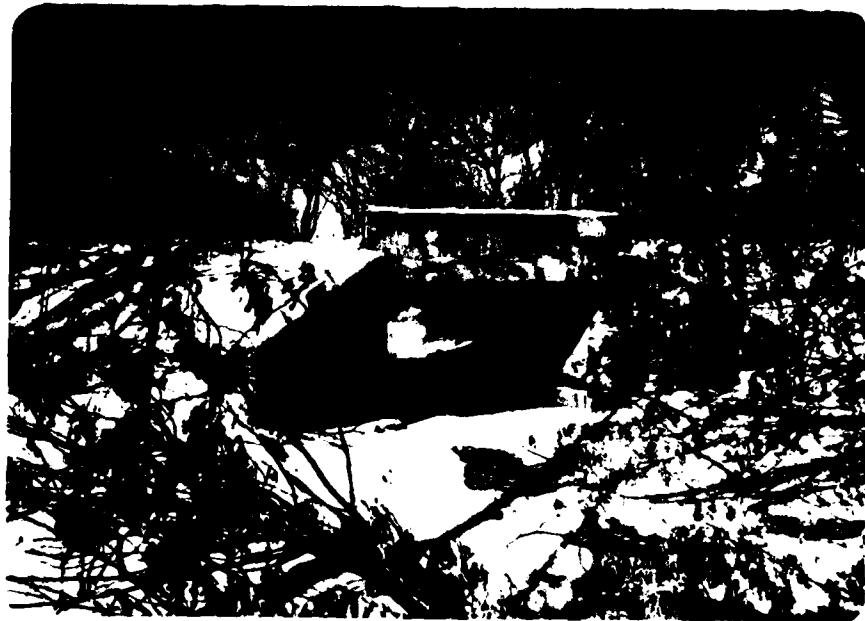


Photo 8 - View of downstream channel crossing under Rocktown-Lambertville Road. (Photo taken on January 13, 1981.)



Photo 9 - View of channel and houses downstream from Rocktown-Lambertville Road. (Photo taken on January 13, 1981.)

APPENDIX C

SUMMARY OF ENGINEERING DATA

CHECK LIST  
HYDROLOGIC AND HYDRAULIC DATA  
ENGINEERING DATA

Name of Dam: SCHILLER POND DAM

Drainage Area Characteristics: 1.4 square miles

Elevation Top Normal Pool (Storage Capacity): 305 NGVD (18 acre-feet)

Elevation Top Flood Control Pool (Storage Capacity): N/A

Elevation Maximum Design Pool: 312.3 NGVD (SDF pool-83 acre-feet)

Elevation Top Dam: 311.5 NGVD (73 acre-feet)

SPILLWAY CREST: Main: 305 NGVD

a. Elevation Auxiliary: 307.5 NGVD

b. Type Main: Concrete drop inlet  
Auxiliary: Natural channel

c. Width Main: 10 feet  
Auxiliary: 20 feet

d. Length Main: 28 feet  
Auxiliary: 60 feet

e. Location Spillover Entire length

f. No. and Type of Gates None

OUTLET WORKS:

a. Type 72-inch C.M.P.

b. Location Upstream face of spillway

c. Entrance Inverts 294.5 NGVD

d. Exit Inverts 294.0 NGVD

e. Emergency Draindown Facilities 18-inch valve 72-inch C.M.P.

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location None

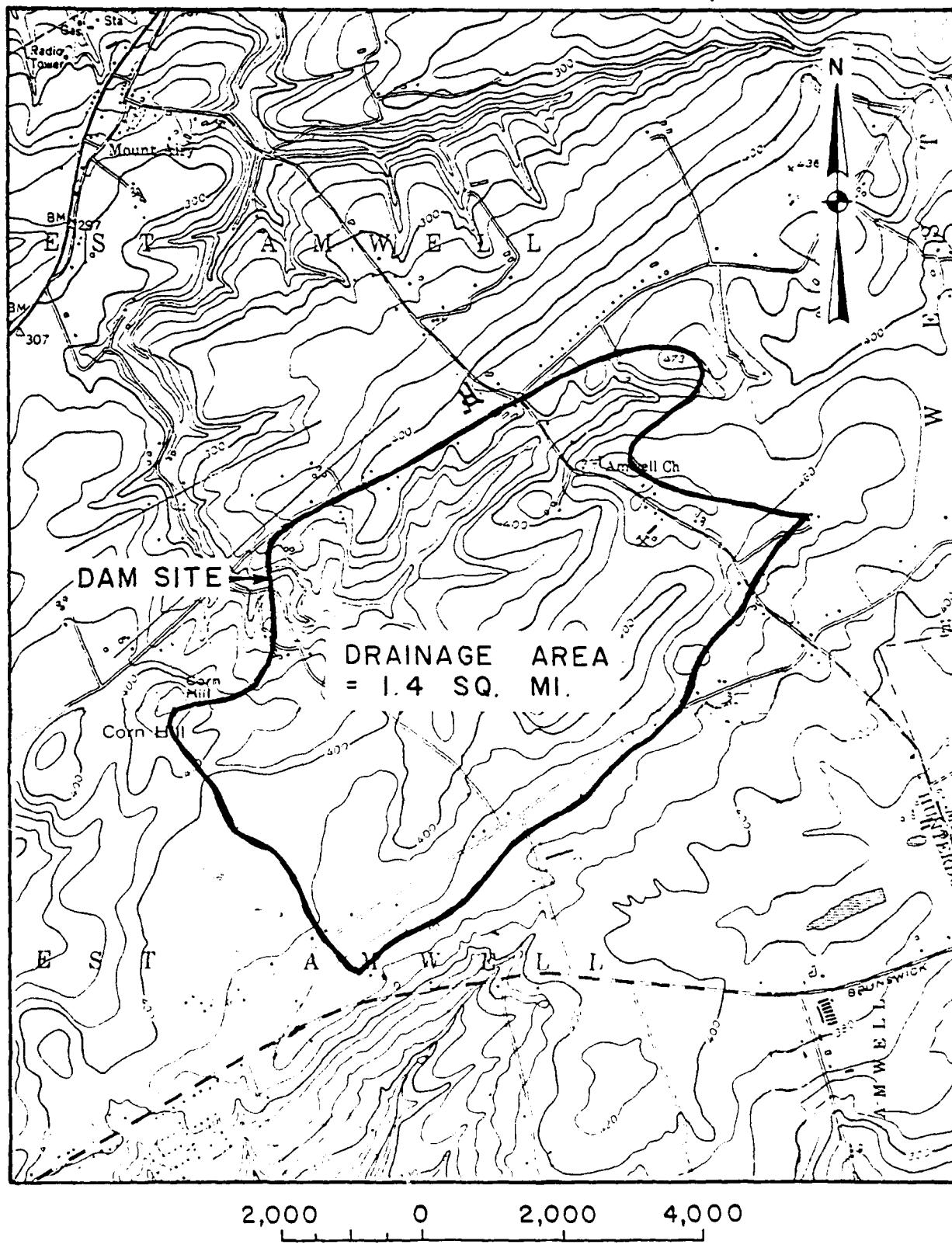
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: 2,207 cfs at elevation 311.5 NGVD

APPENDIX D

HYDROLOGIC COMPUTATIONS

PLATE I, APPENDIX D



SCHILLER POND DAM  
DRAINAGE BASIN

PRC Harris, Inc.  
CONSULTING ENGINEERS

SUBJECT: N. J. Dam Inspection  
Schiller Pond Dam  
COMPUTED BY: S.B. CHECKED BY:

SHEET NO. 1 OF  
JOB NO. 10-1176-01  
DATE. Feb, 1981

Area of the Lake at normal top level :

(Area measured from U.S.G.S quad  
at El = 305.0 = 5.5 Ac.

Height of the Dam = 18.5 FT  
(From File)

Small Dam, High Hazard

$$S.D.F = \frac{1}{2} PNF$$

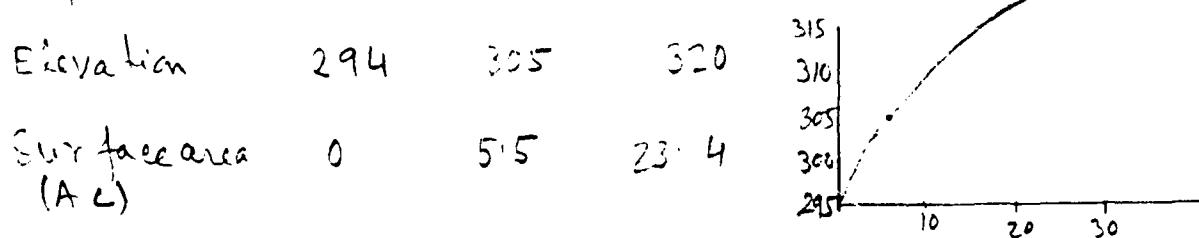
Hydrologic analysis:-

$$D.A = 1.37 \text{ sq. miles}$$

Inflow Hydrograph at Reservoir was determined  
using HEC-1 DB program. Inflow routed  
through the reservoir

Elevation Area Capacity Relationship

Information obtained from U.S.G.S



HEC-1 DB program will calculate

Storage capacity from surface area = at  
elevation.

PRC Harris, Inc.  
CONSULTING ENGINEERS

SUBJECT: N. J. Dam Inspection  
Schiller Pond Dam  
COMPUTED BY: S.B. CHECKED BY: \_\_\_\_\_

SHET NO. 2 OF  
JOB NO. 10-1176-01  
DATE 1/7/60

## Determination of PMP

Probable Maximum Ppt. (inches) for an area of  
10 square miles and 6 hour duration  
= 26"

D.A. = 1.37 sq. miles

ZONE = 6

The corps of Engineers recommended that  
20% reduction be applied to the  
report value for a 10 sq miles drainage  
area in order to provide for the imperfect  
fit of the storm isohyetal patterns to the  
shape of the particular basin.

Because of the unlikelihood of a perfect  
strike of a storm center on any particular  
small basin, no variation is assumed between  
point and 10 square miles precipitation

P.M.P. = 26"  $\times$  (1-0.2) = 20.8" (This adjustment  
is made by the computer)

Depth area duration relationship:

Percentage to be applied to the above 6 hr PMP

6 hr = 100 %

12 hr = 108 %

24 hr = 117 %

48 hr = 127 % (Not necessary)

Infiltration: Initial = 1.0 inch

Const. Infiltration = 0.1 inch/hr

### DETERMINATION OF $T_c$

1. Estimating  $T_c$  from velocity estimate and Watershed length (Ref. Design of Small Dam: Fig 30)

	Slope	Vel	Remarks
Overland Flow	$\frac{473 - 360}{2400} = 4.7\text{ ft/sec}$	3.4 ft/sec	Under berm and as watershed
Reach 1	$\frac{360 - 305}{2950} = 1.9\text{ ft/sec}$	1.5 ft/sec	Natural channel not well defined (Lake excluded)
	$T_c = \frac{2400}{3 \times 3600} + \frac{2950}{1 \times 3600} = 1.04 \text{ hrs.}$		

2. Estimating  $T_c$  assuming same vel of 1.5 ft/sec

$$T_c = \frac{5350}{1.5 \times 3600} = 0.99 \text{ hrs}$$

3. From Nomograph of design of Small Dam (S.C.S. Guide) — Same as Kirpich

$$T_c = \left( \frac{11.9 L^3}{H} \right)^{.385}$$

$L$  in miles = 1.01 miles  
(Lake excluded)

$$= \left( \frac{11.9 \times 1.01^3}{168} \right)^{.385}$$

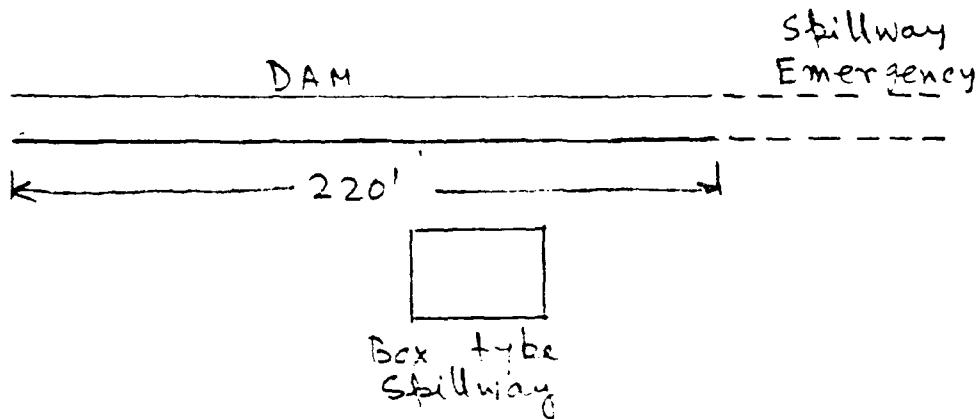
$H$  = 168 Ft.

$$= 1.36 \text{ hrs.}$$

Use  $T_c = 1 \text{ hrs.}$

$$\text{Lag} = 1.6 T_c = 1.6 \times 1 = 0.6 \text{ hrs.}$$

DAM 2 SPILLWAY



Water entering through all four sides of the spillway.

- ✓ Total length of spillway main = 28'
- ✓ Elevation = 305.0 FT MSL

Elevation shown in S.C.S drawing are added with 202 ft to get the actual elevation comparable to U.S.G.S.

- ✓ Total effective length of emergency spillway = 60'
- ✓ Elevation of Aux. Spillway = 307.4 FT MSL
- ~ Length of Dam = 220'
- ~ Ave. El of Dam = 311.5 FT MSL

Outlet 6' & pipe

Drop inlet spillway :-

$$\text{Eff. length} = 28'$$

$$Q_s = C_s L_s H_s^{1.5} = 3.3 \times 28 H_s^{1.5} = 92.4 H_s^{1.5}$$

Considering flow through the tube (6' dia)

$$\begin{aligned} Q_o &= C_d \cdot A_o \cdot \sqrt{2g} H_o \\ &= 1.63 \left( \frac{\pi}{4} \times 6^2 \right) \times 8 \sqrt{H_o} \\ &= 143 \sqrt{H_o} \end{aligned}$$

Where  $H_o$  = Difference of elevation between  
N.W. and T.W.

Tailwater assumed to be = 296 Ft MSL

Invert of the tube 294 Ft MSL

Res. El	Head over Spillway Hs	& through Spillway 92.4 Hs <sup>1.5</sup>	Head for critic flow H_o	Flow thro' critic S_c = 143\sqrt{H_o}	
305	-	0	-	-	
306	1	92.4	Spill 10	452	
307.4	2.4	343	Control 11.4	482	
309	4	739	13	515	
311.5	6.5		15.5	563	
313	9		17	590	Flow controlled by tube.
315	10		19	623	
317	12		21	655	
319	14		23	686	
321	16		25	715	
325	20		29	770	

Stage Outflow relationship :-

① Flow through Drop inlet  $Q_D$  (Skillway)

③ Flow through Emergency Spillway

$$Q_A = 3.3 L_A H_A^{1.5}$$

$$= 3.3 \times 60 H_A^{1.5} = 198 H_A^{1.5}$$

③ Flow through Dam

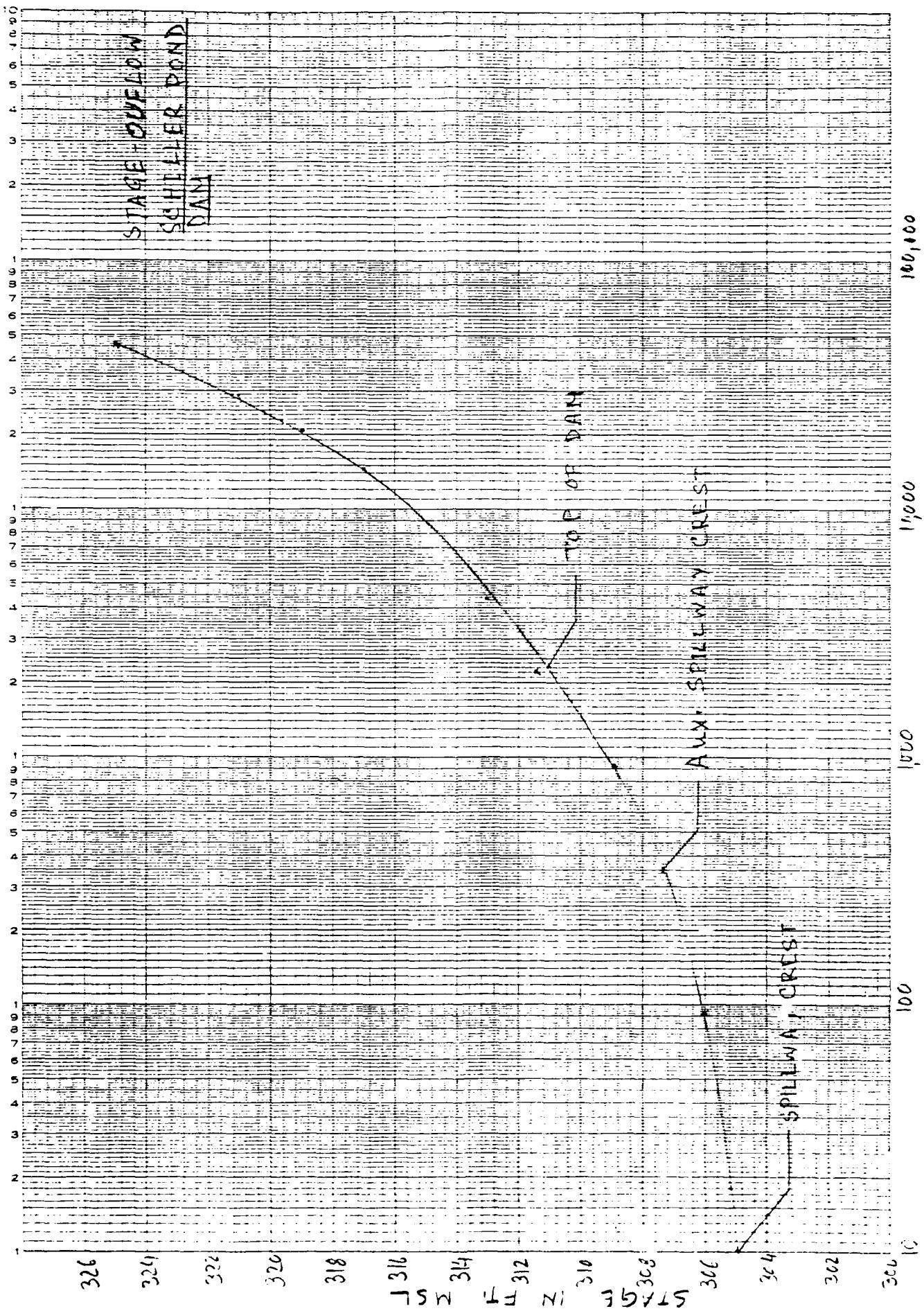
$$Q_D = 2.75 L_D H_D^{1.5}$$

$$= 2.75 \times 220 H_D^{1.5} = 605 H_D^{1.5}$$

Stage in Reservoir	Spillway $L_A$	Emergency Spillway		DAM		Stage Total
		$H_A$	$Q_A$	$H_D$	$Q_D$	
305	0					0
306	92					92
307.4	343	0	0			343
309	515	1.6	400			915
311.5	563	4.1	1,644	0	0	2,207
313	590	5.6	2,624	1.5	1,111	4,325
315	623	7.6	4,149	3.5	3,961	6,733
317	655	9.6	5,289	5.5	7,804	14,348
319	686	11.6	7,823	7.5	12,426	20,935
321	715	13.6	9,931	9.5	17,715	26,361
325	770	17.6	14,620	13.5	36,009	45,399

NO. 34111-510 DIETZGEN GRAPH PAPER  
STANDARD  
5 CYCLES X 10 DIVISIONS PER INCH

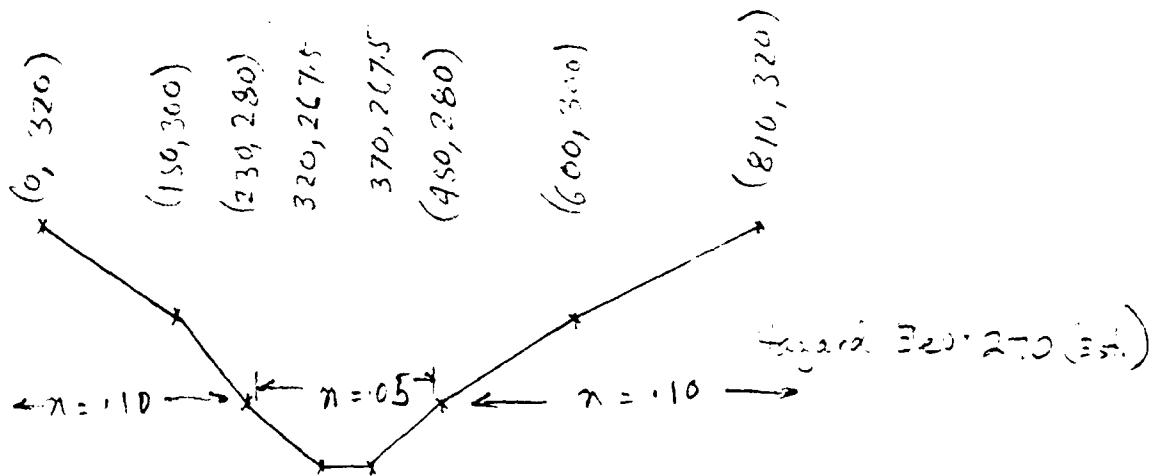
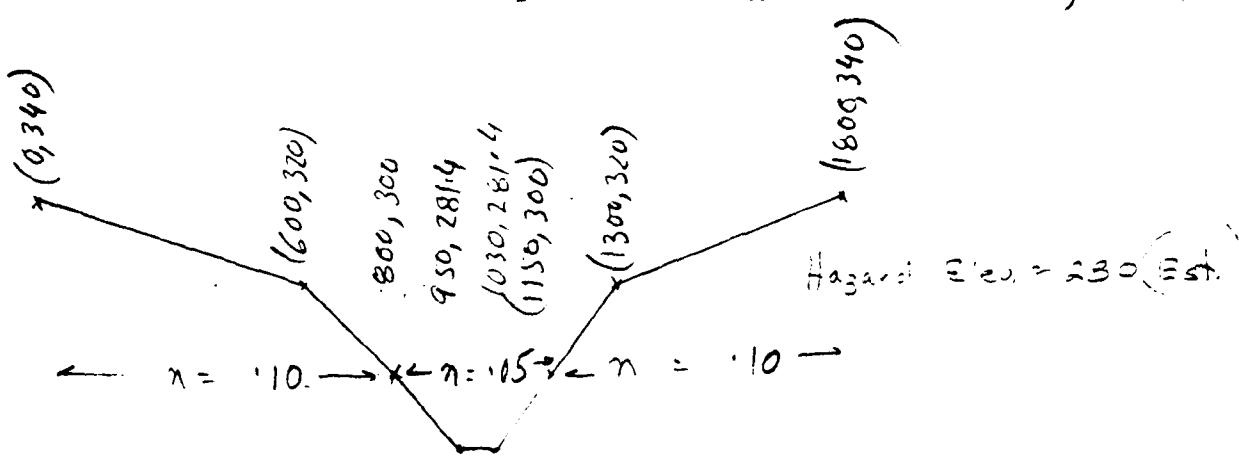
ESTATE PLANNING FOR THE RETIRED



PRC Harris, Inc.  
CONSULTING ENGINEERS

SUBJECT N.J. Dam Inspection  
Schiller Pond Dam  
COMPUTED BY S.B. CHECKED BY

SHEET NO. 8 OF  
 JOB NO. 10-1176-51  
 DATE. Feb, 1981



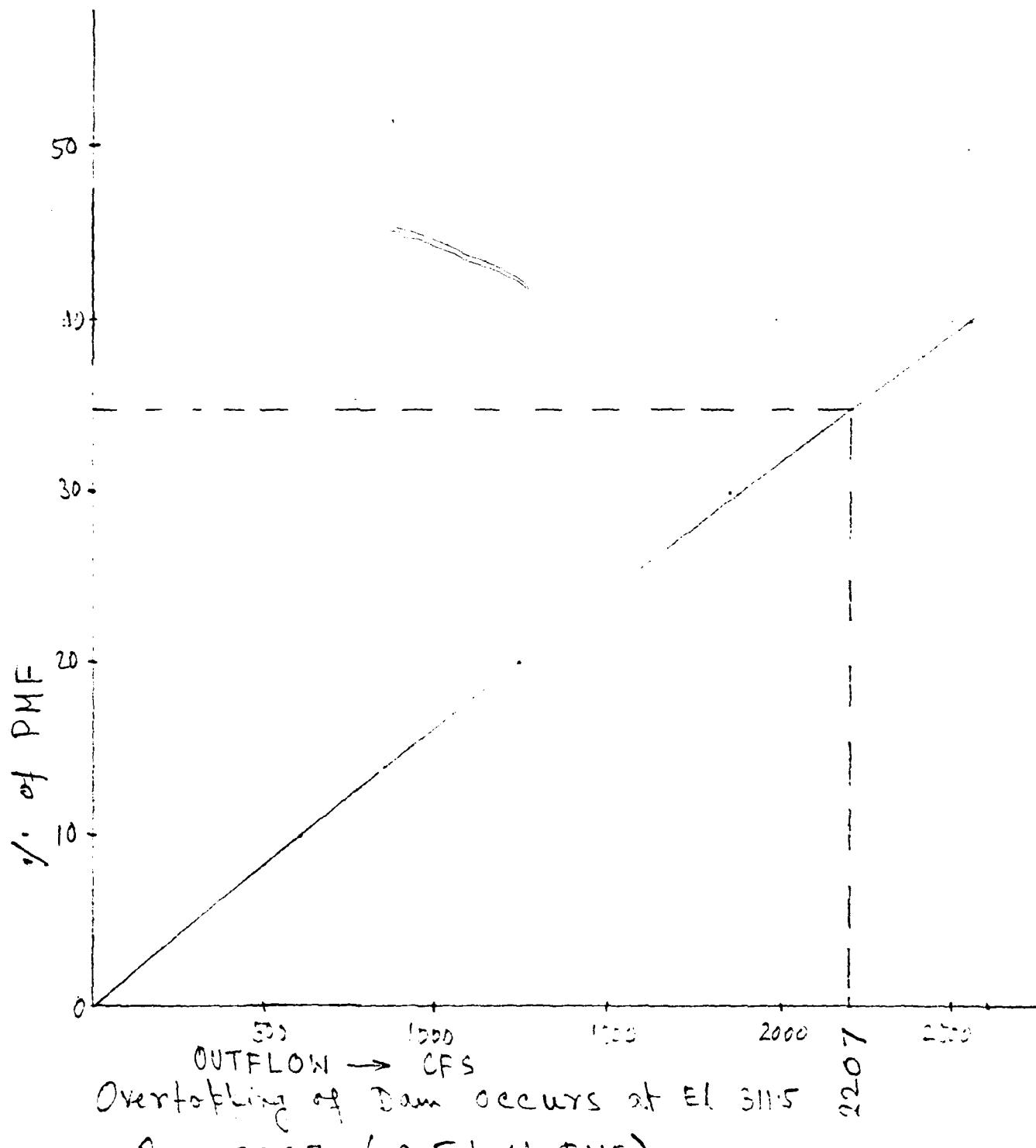
CROSS SECTION AT D/S REACH

PRC Harris, Inc.  
CONSULTING ENGINEERS

SUBJECT: N.J. Dam Inspection  
Schiller Pond Dam  
COMPUTED BY: S.D. CHECKED BY:

SHEET NO. 9 OF  
JOB NO. 10-1176-C1  
DATE Feb. 1981

### Overtopping Potential

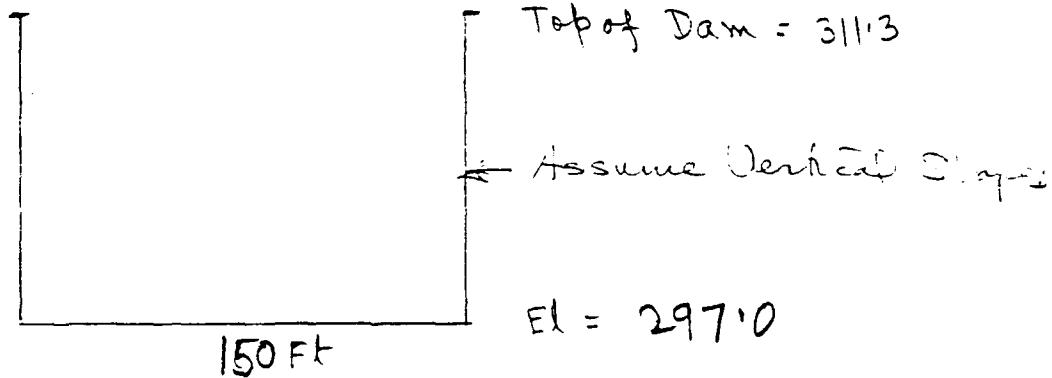


& = 2207 (35% of DHF)

## BREACH ANALYSIS

Assume breach begins to develop when reservoir stage reaches above the dam

Time of Failure = 16.25 hrs.



Effect of breach was analysed at 800 ft D/S of Dam

Max. Stage without Dam break = 285.1

Max. Stage with Dam break = 285.7.

0.6 feet increase @ 0.4 PMP

Effect of breach was also analysed at 2000ft D/S

Max. Stage without Dam break = 271.7

Max. Stage with Dam break = 272.5

There will be 0.8 ft increase in stage  
due to Dam break at 0.4 PMP

Drawdown time Computation

$$EI = 305$$

When the gate is open  
Normal elevation to  
Start = 305.0

$$Inflow = \frac{2.5 \times 10^6}{\text{mi}^2} \times 1.37 = 374$$

(184)

$$299.5$$

$$Q = CA \sqrt{2gh} \quad C = 0.62$$

$$A = \frac{\pi}{4} \times 1.5^2$$

$$\approx 8.8 \sqrt{h}$$

Assume Tailwater Ele. = 299.5 FT

$$A_2 = \left(\frac{h_2}{h_1}\right)^2 A_1 = \left(\frac{h_2}{11}\right)^2 \times 5.5 = 1045 h_2^2 \quad A_1 = 5.5$$

$$h_1 = 11$$

$$\text{Drawdown time} = \frac{\text{Vol in AF} \times 43560}{Q \times 3600} = 12.1 \frac{\text{Vol}}{Q}$$

EI	Area	Avg	Vol	Avg	Q	Drawdown	Cum	Drawdown	
								with inflow	Cum
ft	ac	ac	af	ft	cfs	in/s	hrs		hrs
305	5.5			5.0	5.0	5	19.7	3.7	3.7
304	4.5			4.05	4.05	4	17.6	2.31	5.86
303	3.65			3.27	3.27	3	15.2	2.60	5.46
302	2.88			2.54	2.54	2	12.4	2.56	7.04
301	2.20			1.91	1.91	1	8.6	2.71	9.75
300	1.62			1.47	1.47	1.25	4.4	2.13	13.88
299.5	1.36							1.12	19.95

Time of drawdown without inflow = 15.88  $\approx$  16 hrs.

Time of drawdown with const. inflow = 20 hrs.

1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43		44		45		46		47		48		49		50		51		52		53		54		55		56		57		58		59		60		61		62		63		64		65		66		67		68		69		70		71		72		73		74		75		76		77		78		79		80		81		82		83		84		85		86		87		88		89		90		91		92		93		94		95		96		97		98		99		100		101		102		103		104		105		106		107		108		109		110		111		112		113		114		115		116		117		118		119		120		121		122		123		124		125		126		127		128		129		130		131		132		133		134		135		136		137		138		139		140		141		142		143		144		145		146		147		148		149		150		151		152		153		154		155		156		157		158		159		160		161		162		163		164		165		166		167		168		169		170		171		172		173		174		175		176		177		178		179		180		181		182		183		184		185		186		187		188		189		190		191		192		193		194		195		196		197		198		199		200		201		202		203		204		205		206		207		208		209		210		211		212		213		214		215		216		217		218		219		220		221		222		223		224		225		226		227		228		229		230		231		232		233		234		235		236		237		238		239		240		241		242		243		244		245		246		247		248		249		250		251		252		253		254		255		256		257		258		259		260		261		262		263		264		265		266		267		268		269		270		271		272		273		274		275		276		277		278		279		280		281		282		283		284		285		286		287		288		289		290		291		292		293		294		295		296		297		298		299		300		301		302		303		304		305		306		307		308		309		310		311		312		313		314		315		316		317		318		319		320		321		322		323		324		325		326		327		328		329		330		331		332		333		334		335		336		337		338		339		340		341		342		343		344		345		346		347		348		349		350		351		352		353		354		355		356		357		358		359		360		361		362		363		364		365		366		367		368		369		370		371		372		373		374		375		376		377		378		379		380		381		382		383		384		385		386		387		388		389		390		391		392		393		394		395		396		397		398		399		400		401		402		403		404		405		406		407		408		409		410		411		412		413		414		415		416		417		418		419		420		421		422		423		424		425		426		427		428		429		430		431		432		433		434		435		436		437		438		439		440		441		442		443		444		445		446		447		448		449		450		451		452		453		454		455		456		457		458		459		460		461		462		463		464		465		466		467		468		469		470		471		472		473		474		475		476		477		478		479		480		481		482		483		484		485		486		487		488		489		490		491		492		493		494		495		496		497		498		499		500		501		502		503		504		505		506		507		508		509		510		511		512		513		514		515		516		517		518		519		520		521		522		523		524		525		526		527		528		529		530		531		532		533		534		535		536		537		538		539		540		541		542		543		544		545		546		547		548		549		550		551		552		553		554		555		556		557		558		559		560		561		562		563		564		565		566		567		568		569		570		571		572		573		574		575		576		577		578		579		580		581		582		583		584		585		586		587		588		589		590		591		592		593		594		595		596		597		598		599		600		601		602		603		604		605		606		607		608		609		610		611		612		613		614		615		616		617		618		619		620		621		622		623		624		625		626		627		628		629		630		631		632		633		634		635		636		637		638		639		640		641		642		643		644		645		646		647		648		649		650		651		652		653		654		655		656		657		658		659		660		661		662		663		664		665		666		667		668		669		670		671		672		673		674		675		676		677		678		679		680		681		682		683		684		685		686		687		688		689		690		691		692		693		694		695		696		697		698		699		700		701		702		703		704		705		706		707		708		709		710		711		712		713		714		715		716		717		718		719		720		721		722		723		724		725		726		727		728		729		730		731		732		733		734		735		736		737		738		739		740		741		742		743		744		745		746		747		748		749		750		751		752		753		754		755		756		757		758		759		760		761		762		763		764		765		766		767		768		769		770		771		772		773		774		775		776		777		778		779		780		781		782		783		784		785		786		787		788		789		790		791		792		793		794		795		796		797		798		799		800		801		802		803		804		805		806		807		808		809		810		811		812		813		814		815		816		817		818		819		820		821		822		823		824		825		826		827		828		829		830		831		832		833		834		835		836		837		838		839		840		841		842		843		844		845		846		847		848		849		850		851		852		853		854		855		856		857		858		859		860		861		862		863		864		865		866		867		868		869		870		871		872		873		874		875		876		877		878		879		880		881		882		883		884		885		886		887		888		889		890		891		892		893		894		895		896		897		898		899		900		901		902		903		904		905		906		907		908		909		910		911		912		913		914		915		916		917		918		919		920		921		922		923		924		925		926		927		928		929		930		931		932		933		934		935		936		937		938		939		940		941		942		943		944		945		946		947		948		949		950		951		952		953		954		955		956		957		958		959		960		961		962		963		964		965		966		967		968		969		970		971		972		973		974		975		976		977		978		979		980		981		982		983		984		985		986		987		988		989		990		991		992		993		994		995		996		997		998		999		1000		1001		1002		1003		1004		1005		1006		1007		1008		1009		1010		1011		1012		1013		1014		1015		1016		1017		1018		1019		1020		1021		1022		1023		1024		1025		1026		1027		1028		1029		1030	





CLASSIFICATION OF STREAMS OF VARIOUS SIZES, FOR MULTIPLE PLANE-RATIO ECONOMIC COMPUTATIONS  
FLOW IN CUBIC FEET PER SECOND  
AREA IN SQUARE MILES (ONE MILLION FEET)

CLASSIFICATION	AREA	PLAN, SAILING	RELATION	AREA, SAILING	RELATION	WATER, 4 FEET	WATER, 8 FEET	WATER, 12 FEET
CLASS A	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS B	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS C	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS D	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS E	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS F	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS G	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS H	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS I	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS J	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS K	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS L	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS M	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS N	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS O	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS P	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS Q	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS R	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS S	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS T	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS U	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS V	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS W	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS X	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS Y	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00
CLASS Z	1.000	1.000	1	0.500	0.464	0.25	0.50	1.00









## TATION DAY

(14) TRIP SPOTTER (15) DASH HYDROGRAPH (16) POINTS AT NO-MAX TIME INTERVAL

(17) COFFEE BREAK (18) OCPTIN (19) 2600. (20) 2800. (21) 3000. (22) 3200. (23) 3400. (24) 3600.

(25) 3800. (26) 4000. (27) 4200. (28) 4400. (29) 4600. (30) 4800. (31) 5000. (32) 5200. (33) 5400. (34) 5600.

(35) 5800. (36) 6000. (37) 6200. (38) 6400. (39) 6600. (40) 6800. (41) 7000. (42) 7200. (43) 7400. (44) 7600.

(45) 7800. (46) 8000. (47) 8200. (48) 8400. (49) 8600. (50) 8800. (51) 9000. (52) 9200. (53) 9400. (54) 9600.

(55) 9800. (56) 10000. (57) 10200. (58) 10400. (59) 10600. (60) 10800. (61) 11000. (62) 11200. (63) 11400. (64) 11600.

(65) 11800. (66) 12000. (67) 12200. (68) 12400. (69) 12600. (70) 12800. (71) 13000. (72) 13200. (73) 13400. (74) 13600.

(75) 13800. (76) 14000. (77) 14200. (78) 14400. (79) 14600. (80) 14800. (81) 15000. (82) 15200. (83) 15400. (84) 15600.

(85) 15800. (86) 16000. (87) 16200. (88) 16400. (89) 16600. (90) 16800. (91) 17000. (92) 17200. (93) 17400. (94) 17600.

(95) 17800. (96) 18000. (97) 18200. (98) 18400. (99) 18600. (100) 18800. (101) 19000. (102) 19200. (103) 19400. (104) 19600.

(105) 19800. (106) 20000. (107) 20200. (108) 20400. (109) 20600. (110) 20800. (111) 21000. (112) 21200. (113) 21400. (114) 21600.

(115) 21800. (116) 22000. (117) 22200. (118) 22400. (119) 22600. (120) 22800. (121) 23000. (122) 23200. (123) 23400. (124) 23600.

(125) 23800. (126) 24000. (127) 24200. (128) 24400. (129) 24600. (130) 24800. (131) 25000. (132) 25200. (133) 25400. (134) 25600.

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(145) 27800. (146) 28000. (147) 28200. (148) 28400. (149) 28600. (150) 28800. (151) 29000. (152) 29200. (153) 29400. (154) 29600.

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(165) 31800. (166) 32000. (167) 32200. (168) 32400. (169) 32600. (170) 32800. (171) 33000. (172) 33200. (173) 33400. (174) 33600.

(175) 33800. (176) 34000. (177) 34200. (178) 34400. (179) 34600. (180) 34800. (181) 35000. (182) 35200. (183) 35400. (184) 35600.

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(205) 39800. (206) 40000. (207) 40200. (208) 40400. (209) 40600. (210) 40800. (211) 41000. (212) 41200. (213) 41400. (214) 41600.

(215) 41800. (216) 42000. (217) 42200. (218) 42400. (219) 42600. (220) 42800. (221) 43000. (222) 43200. (223) 43400. (224) 43600.

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(235) 45800. (236) 46000. (237) 46200. (238) 46400. (239) 46600. (240) 46800. (241) 47000. (242) 47200. (243) 47400. (244) 47600.

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(265) 51800. (266) 52000. (267) 52200. (268) 52400. (269) 52600. (270) 52800. (271) 53000. (272) 53200. (273) 53400. (274) 53600.

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(365) 71800. (366) 72000. (367) 72200. (368) 72400. (369) 72600. (370) 72800. (371) 73000. (372) 73200. (373) 73400. (374) 73600.

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